

CLAIMS

What is claimed is:

1. A method for preparing a protected article, comprising the steps of providing the article; depositing a bond coat onto an exposed surface of the article; and producing a thermal barrier coating on an exposed surface of the bond coat, wherein the step of producing the thermal barrier coating includes the steps of depositing a primary ceramic coating onto the exposed surface of the bond coat, depositing a cerium-oxide-precursor compound onto an exposed surface of the primary ceramic coating, and heating the cerium-oxide-precursor compound in an oxygen-containing atmosphere to form cerium oxide adjacent to the exposed surface of the primary ceramic coating.
2. The method of claim 1, wherein the step of providing the article includes the step of providing the article as a nickel-base superalloy article.
3. The method of claim 1, wherein step of providing the article includes the step of providing the article in the form of a component of a gas turbine engine.
4. The method of claim 1, wherein the step of depositing the bond coat includes the step of depositing a diffusion aluminide or an aluminum-containing overlay bond coat.
5. The method of claim 1, wherein the step of depositing the primary ceramic

coating includes the step of
depositing yttria-stabilized zirconia as the primary ceramic coating.

6. The method of claim 1, wherein the step of depositing the cerium-oxide-precursor compound includes the step of
furnishing $(NH_4)Ce(SO_4)_3$ as the cerium-oxide-precursor compound.

7. The method of claim 1, wherein the step of depositing the cerium-oxide-precursor compound includes the step of
infiltrating the cerium-oxide-precursor compound into the exposed surface of the primary ceramic coating,

8. The method of claim 1, wherein the step of heating includes the step of
heating the cerium-oxide-precursor compound to form cerium oxide with the cerium in the +4 valence state.

9. A method for preparing a protected article, comprising the steps of
providing a nickel-base superalloy article that is a component of a gas turbine engine;

depositing a bond coat onto an exposed surface of the article; and
producing a thermal barrier coating on an exposed surface of the bond coat, wherein the step of producing the thermal barrier coating includes the steps of

depositing a yttria-stabilized zirconia primary ceramic coating onto the exposed surface of the bond coat,

infiltrating a cerium-oxide-precursor compound from an exposed surface of the primary ceramic coating into the primary ceramic coating, and

heating the cerium-oxide-precursor compound to form cerium oxide adjacent to the exposed surface of the primary ceramic coating.

10. The method of claim 9, wherein the step of depositing the primary ceramic

Attorney Docket No. 130013/11921 (21635-0116)

coating includes the step of
depositing yttria-stabilized zirconia having about 7 percent yttria by weight.

11. The method of claim 9, wherein the step of depositing the cerium-oxide-precursor compound includes the step of
furnishing $(\text{NH}_4)\text{Ce}(\text{SO}_4)_3$ as the cerium-oxide-precursor compound.

12. The method of claim 9, wherein the step of heating includes the step of
heating the cerium-oxide-precursor compound to form cerium oxide with the cerium
in the +4 valence state.

13. A method for preparing a protected article, comprising the steps of
providing the article;
depositing a bond coat onto an exposed surface of the article; and
producing a thermal barrier coating on an exposed surface of the bond coat, wherein
the thermal barrier coating comprises
a primary ceramic coating on the exposed surface of the bond coat, and
a sintering-inhibitor region at a surface of the primary ceramic coating,
wherein the sintering-inhibitor region comprises cerium oxide in a concentration greater
than a general cerium oxide concentration in the primary ceramic coating.

14. The method of claim 13, wherein the step of providing the article includes
the step of
providing the article as a nickel-base superalloy article.

15. The method of claim 13, wherein step of providing the article includes the
step of
providing the article in the form of a component of a gas turbine engine.

16. The method of claim 13, wherein the step of depositing the bond coat

Attorney Docket No. 130013/11921 (21635-0116)

includes the step of

depositing a diffusion aluminide or an aluminum-containing overlay bond coat.

17. The method of claim 13, wherein the step of producing the thermal barrier coating includes the step of

depositing yttria-stabilized zirconia as the primary ceramic coating.